Manual for Air Quality Considerations in Environmental Documents

Federal Highway Administration
Utah Division
and
Utah Department of Transportation
October 24, 2001

Disclaimer: Neither regulatory or prescriptive, this manual provides general information and guidance on appropriate levels of air quality consideration for individual projects. However, working arrangements developed between the State DOT and air quality agencies may not exactly replicate this process, and may even exceed these recommendations. This manual is intended solely as an informal guideline to be used in the development of Environmental Documentation. It is in no way intended to replace or supercede the Transportation Conformity Regulations 40 CFR Parts 51 and 93, 23 CFR Part 771, or any CEQ, EPA, FHWA, and FTA regulatory requirements or guidance pertaining to development of Environmental Documents. For further information on the correct use of this manual you may contact:

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FORWARD

Summary of Air Quality Documentation Requirements for NEPA Documents:

All Projects	**Exempt Projects**	**Capacity Adding Projects over ½ Mile**
		Non-Attainment/ Maintenance Areas CO, Ozone and/or PM-10
* Construction Dust control Plan	*See Appendix E (No hot Spot or Conformity Analysis)	*Construction Dust Control Plan * DEQ Coordination * DEQ Permit for Major Projects *CO Hot Spot (all areas) *PM-10 Hot Spot (Only in PM-10 Maintenance and Non-Attainment Areas) *Inclusion in a Conforming LRTP and TIP
		All other Areas *Construction Dust Control Plan *CO Hot Spot (all areas) * DEQ Permit for Major Projects

I. Introduction

The focus of this effort is centered on suggested methods for appropriate consideration of project-orientated air quality for the three types of environmental documentation required by the National Environmental Policy Act (NEPA): Categorical Exclusion (CE), Environmental Assessment (EA), and Environmental Impact Statement (EIS).

Project-level air quality considerations may vary significantly in content and level of detail from one project to another, based on the following:

Project Purpose and Need
Project Area
Magnitude of Project Impact

Federal Highway Administration (FHWA) guidance allows for considerable flexibility in performing air quality analyses, in which the scope, content, assumptions, and level of technical detail are typically coordinated between the State Department of Transportation (DOT) and the State and/or local air quality agencies, in Utah the Division of Air Quality (DAQ).

Local conditions such as project location, topography, and meteorology influence the type and level of necessary analysis. Large projects located in urbanized areas, as well as controversial projects involved in litigation or embroiled in other challenges, typically require detailed analyses. Detailed air quality examinations may also be necessary for projects located in geographical areas with unique topography or adverse meteorology.

Utah has several areas classified as nonattainment areas: Salt Lake, Utah and Weber Counties. These counties are nonattainment for either: particulate matter (PM10) or sulfur dioxide (SO2). Provo City is a nonattainment area for carbon monoxide (CO). Salt Lake City and Ogden Cities are nonattaiment areas for Carbon Monoxide (CO). Salt Lake and Southern Davis Counties are a maintenance area for Ozone (O3).

Utah has some environmental rules which require a permit prior to the construction of a major transportation facility and the handling of dust during construction. These rules usually have an overriding influence on the scope, content, and level of detail of the analyses performed for an environmental document. Consultation should take place between UDOT and the Division of Air Quality (DAQ) to assure that all appropriate air quality permits are issued for projects in a nonattainment area..

II. Pollutants

The following are typical on-road (i.e, highway and transit-related) mobile source pollutants that require evaluation during the transportation planning and /or project development phases.

A. Carbon Monoxide (CO)

CO is emitted directly into the atmosphere from automobiles, with the highest levels occurring at slow speeds, in stop-and-go traffic, and at colder temperatures. Because it disperses to non-harmful levels fairly rapidly, CO is considered a localized hot-spot pollutant, and is the primary pollutant analyzed at the individual project level. There are currently two CO National Ambient Air Quality Standards (NAAQSs): a one-hour standard of 35.0 parts per million (ppm) and an eight-hour standard of 9.0 ppm.

As a result of the 1990 Clean Air Act (CAA) Amendments, emphasis has also been focused on regional CO emissions level. Areas (generally counties) with a design value greater than or equal to 9.1 ppm are now designated as non-attainment for CO. Like Ozone (see C. page 4), CO non-attainment and maintenance areas must also regard the regional composition of CO through the systems-level urban transportation planning process. Appropriate levels of analysis should be performed to assure that regional or localized violations of the NAAQSs do not occur.

For an individual project, if the CO hot-spot analysis indicates a potential violation of a CO standard, the environmental document needs to commit to appropriate mitigation measures, based on coordination with EPA and the respective State and local air quality agencies. A possible exception is an instance in which the proposed project area contains pre-existing CO violations. Mitigation strategies may not be needed if, after appropriate coordination with EPA, a demonstration can be made in the environmental document that the existing localized CO violation would be made better as a result of project implementation.

B. Particulate Matter(PM10)

Typical sources of particulate matter emissions include diesel exhaust, forestry production activities, unpaved roads, construction activities and re-entrained road dust. Formation of "secondary" PM10 is a phenomenon which is enhanced by cold damp conditions such as those which persist during Utah's wintertime temperature inversions, when strong temperature inversions trap air in the valleys during wintertime. This problem is aggravated by the conversion of gaseous (NOx), into very small particles.

Although normally addressed in regard to the control of dust from construction activities, project-related particulate matter will be examined in both regional conformity analysis and localized hot-spot. The localized quantitative PM10 hot-spot test is not required until the EPA releases methodology for the analyses. A qualitative PM10 hot-spot test should be conducted in the area effect

by the project.

C. Ozone (O3)

Tropospheric ozone (i.e., ground-level photochemical smog) from a chemical reaction between volatile organic compounds (VOCs) and oxides of nitrogen (NO and NO2) in the presence of sunlight. Also, the concentration and dispersion of ozone are significantly affected by an areas meteorology and topography. Because it is more of an areawide pollutant, and is typically assessed in systems-level planning as part of the air quality State Implementation Plan (SIP) development and conformity processes. Therefore, ozone is a concern at the project level as that project is taken as part of the whole regional transportation program but not a concern as a hot-spot pollutant.

D. Other Motor vehicle Pollutants

Other emissions from vehicles and other internal combustion engines consist of SO2, and the ozone and PM-10 precursors NOx and VOC. The federal government is responsible for vehicle emission standards in most states. State and local governments are responsible for ensuring the vehicle emission control systems continue to meet federal standards through inspection and maintenance (I/M) programs. These pollutants require no evaluation at the project hot-spot level.

III. Considerations

The NEPA provides broad authority and responsibility for evaluating and mitigating adverse environmental effects (including air quality) which result from the implementation of a proposed project receiving Federal funding and/or approval. Depending upon the scope of the anticipated impacts, one of three types of environmental documentation must be prepared to satisfy the NEPA: CE, EA, and EIS.

Regardless of the type of project-orientated NEPA document involved, air quality considerations of capacity adding projects must adequately address two requirements:

1. Transportation Conformity, assuming the area is classified as non-attainment or attainment in the maintenance period, and
2. CO and PM-10 Hot-Spot Analyses for the NEPA document itself. Some projects which do not add highway capacity such as safety improvements are considered exempt from air quality analysis. A list of the projects which EPA has defined as 'exempt" is found in Appendix E of this document.

A. Transportation Conformity

Transportation Conformity addresses a projects influence on the overall goals set forth in the Long Range Transportation Plan (TP) and Transportation Improvement Program (TIP) so that those goals contribute to the reduction in the number and severity of violations of the NAAQS. Having the project part of a currently conforming TP and TIP along with the applicable hot spot analsis fulfills the requirement for transportation conformity for projects in non-attainment or maintenance areas. If the project is not in a non-attainment or maintenance area then transportation conformity requirements do not apply.

Project-level analysis of CO hot-spots and the potential impacts the project may have in violating the one- and eight-hour CO NAAQS occurs in the project development phase. This analysis is performed to satisfy the requirements of transportation conformity for Hot-Spot analyses (refer to Appendix A) and the air quality portion of the environmental document (refer to Appendix B, C and D). During project development, all reasonable alternatives under consideration are analyzed to determine the air quality impacts. In addition, Hot-Spot analyses must be performed to satisfy transportation conformity requirements in CO and/or PM10 in non-attainment and maintenance areas.

While Transportation Conformity typically involves a comparison of the future emissions levels designated in the SIP with those to be expected from a system-wide perspective (reflected in the TP and TIP), the air quality analysis performed as part of the NEPA environmental documentation process is concerned with a project-level examination of localized circumstances, namely CO emissions

dispersion and concentration in the vicinity of the proposed project.

According to Section 176(c) of the CAA, transportation plans, programs and projects cannot:

(1) Create new NAAQS violations,
(2) Increase the frequency or severity of existing NAAQS violations or
(3) Delay attainment of the NAAQS if located in non-attainment or maintenance areas.

40 CFR Parts 51 and 93 currently require non-attainment and maintenance areas to determine conformity from two spatial perspectives. First, the area must demonstrate that regional implementation of projects contained in the TP and TIP contribute to the overall emissions reductions to be consistent with the emission reduction goals established in the applicable SIP. This would satisfy the requirements for project level conformity determinations from the individual project perspective (refer to Appendix C).

The second perspective is at the project development phase. In addition to the regional emissions analysis requirements, if a project is located in a CO or PM10 non-attainment or maintenance area, it must satisfy Hot-Spot analysis requirements (refer to Appendix A). Usually incorporated in the environmental document, this determination must be based on an analysis of potential local hot-spot effects. While this additional microscale analysis is not to be confused with the project related NEPA requirements for CO, the analysis methodologies may in fact be identical and, therefore, used interchangeably.

In summary, it is possible to have two requirements that must be satisfied for projects in order to move forward in non-attainment and maintenance areas: 1. a Project-level conformity analysis (refer to Appendix C), which must be satisfied in all nonattainment and maintenance areas, 2. a quantitative Hot-Spot analysis for CO or PM10 nonattainment and maintenance areas (refer to Appendix A and D), or a qualitative analysis for CO and PM10 (refer to Appendix E)

B. NEPA Air Quality Assessment

In addition to the consideration of transportation conformity, a NEPA air quality assessment, also referred to as project level CO concentration Hot-Spot analysis, is required for capacity adding highway projects that are a half-mile or more in length. For purposes of environmental documents, the analysis is the general assessment of potential violations which may occur if the project, with consideration of alternatives, is implemented. This analysis is compared to the one-hour and, possibly, the eight-hour CO NAAQS, which again are 35.0 and 9.0 ppm, respectively. The level of analysis depends upon the scope and location of the proposed project as well as the type of environmental document involved (CE, EA, or EIS).

In some cases, the level of analysis may not be obvious. The following discussion provides a summary of the levels of air quality analysis and the types of NEPA documents for which these methods are most appropriate. The diagram Levels of CO Hot-Spot Analyses summarizes the ranges of analysis. All analyses methods and assumptions must be based on best engineering/planning practices. The following is an explanation of the three types of analyses. (Refer to page 11 diagram for visual display.)

Simplified Analysis. This type of analysis is most appropriate for projects which, by definition, do not involve significant Air Quality impacts. In general, such a project will have no affect on areawide air quality levels, and may even provide some localized air quality benefits. Therefore, an in-depth examination is not necessary. The main focus of this approach is to verify that the project will not create a new violation or exacerbate an existing violation of the various CO NAAQS.

A simplified analysis is applicable if the project CO contribution, plus background concentration, can be judged to be well below the one and eight-hour NAAQS. This judgement may be based on either; (1) previous analyses from similar projects, or (2) previous general analyses for various classes of projects. For example, low-volume roads in rural areas would be an example of one class of project not normally requiring detailed analysis. In such cases, the environmental document should contain a brief statement that justifies this determination.

This methodology is appropriate for projects processed with a CE, and possibly some types of EAs. However, if there is doubt whether a particular project processed as a CE possesses potential negative air quality impacts, a sketch or modeled analysis methodology may be warranted.

Sketch Analysis. A sketch analysis technique normally consists of using Alook-up tables@ based on the most recent version of MOBILE to estimate emission factors, combined with nomographs to yield simplified dispersions of CO concentrations. When utilizing the sketch analysis methodology, project-specific total CO concentrations (project plus background concentrations) are calculated for the preferred alternative at a reasonable worst-case receptor site (refer to Section C). The results should then be reported and compared with the NAAQS and any applicable state standards. Reliance on the use of sketch-type graphical evaluations should be documented with a brief discussion of the basis for such judgement.

Upon completion of the sketch analyses, several types of results are possible. The following summarizes these situations, and provides discussion for conducting additional analyses.

1. If the sketch methodology predicts site-specific impacts which are judged to be well below the one and eight-hour NAAQS, additional or more extensive microscale CO analyses (utilizing a dispersion model) are not necessary. The threshold for such a determination is dependent on the meteorological persistence factor (PF){see page 12 for more information} used to convert the one-hour CO concentration to an eight-hour estimate. For example, an estimated one-hour CO concentration of less

than 15.0 ppm (assuming a PF of 0.6) would not necessitate a microscale analysis.
2. Additionally, if a project is located in an area where high traffic volumes of meteorological stagnation conditions are expected over an eight-hour period of time, a modeled emission analysis is required .

Generally, sketch analysis procedure is adequate for most projects processed with an EA. In addition, some CE-type projects may need to be analyzed with this technique. Regardless, if the predicted CO concentrations exceed the criteria noted above, a more detailed analysis using computer modeling techniques should be conducted. A modeled microscale analysis is also necessary if it is uncertain whether a potential air quality impact exists from implementation of the project.

Modeled Analysis. A modeled microscale CO analysis involves generation of area-specific mobile source CO emission factors, based on the most current version of the MOBILE model. Depending on the type of project analyzed, these emission factors are then utilized in an appropriate pollutant dispersion model. The current stock of such models assumes a normal (Gaussian) dispersion of pollutants, adjusted by factors such as; wind speed, wind direction, atmospheric stability, temperature, surface roughness, and elevation. The dispersion models primarily recognized by EPA, at this time, are CALINE (California Line Source Dispersion Model) and CAL3QHC (California Intersection/Line Source Dispersion Model). A modeled CO microscale analysis is appropriate for most projects processed with an EIS, as well as some EA projects.

A modeled CO analysis considers each alternative - including the no-build - rather than only the preferred alternative, for the estimated time of completion and design year. Although a brief summary of analysis methodologies and assumptions should be included in the environmental document, lengthy discussions should be provided in a separate technical report and referenced in the project document.

Total CO concentrations (project contributions plus background) at reasonable receptor sites for each alternative should be reported and compared with applicable State and national standards. The "build" alternatives should show an improvement in air quality over the "no-build" scenario, with these results to be appropriately reflected in the environmental document. Use of a table is recommended for purposes of comparison in showing concentrations, with associated location, by alternative.

Upon completion of the modeled one-hour CO analyses, three types of results are possible. The following summarizes these situations, and provides guidance for conducting additional analyses and/or reporting results.

1. If the modeled one-hour CO concentration is equal to or greater than the eight-hour NAAQS (9.0 ppm), a simplified calculation of an eight-hour concentration should be performed by multiplying the eight-hour average traffic by a PF, dividing by the one-hour traffic, then multiplying by the one-hour CO analysis concentration:

8-hour CO = [(PF) x (8-hour average hourly traffic) / (peak hour traffic)] x 1-hour CO

If no exceedence of the eight-hour standard is predicted with this procedure, further analysis is generally not necessary.

2. If use of the above eight-hour modification of the modeled one-hour analyses continues to predict an exceedence, then eight separate modeled one-hour analyses should be performed and the results averaged.

3. If the modeled one-hour analysis predicts a CO concentration which is less than 9.0 ppm, separate eight-hour analyses are not necessary. In this case, the environmental document should indicate that no violations of the eight hour CO standard are expected since the worst one-hour CO concentration is less than the eight-hour CO NAAQS.

If the analysis of the preferred alternative indicates a potential violation of a CO NAAQS, the environmental document needs to commit to the implementation of appropriate mitigation strategies, based on coordination with EPA and the respective State and local air quality agencies. Air quality mitigation strategies for CO generally include any activity which reduces congestion and increases facility speeds. For urban intersections, this may involve measures such as parking restrictions or changes in signal timing.

A possible exception to the need to develop air quality mitigation strategies occurs when the proposed project area contains pre-existing CO violations. Mitigation strategies may not be needed if, after coordination with EPA, a demonstration can be made in the environmental document that the existing localized CO violations will be either eliminated or reduced in severity and number as a result of the project. Therefore, any "new" or relocated violations must be confined to the immediate project area.

Levels of CO Hot-Spot Analyses in NEPA Documents

<------------CE---------->::>
<--------------------------------------EA------------------------------------->:::::::::::::::::::::::::::::::>
<::<-------------------------------------EIS-------------------------->

<u>Simplified</u>
* State basis for judgement of no expected CO impacts

<u>Sketch</u> (see page 8)
* Look-up tables for CO emission rates
* Graphic solution for CO concentration
* Background levels assumed
* Use worst-case receptor site
* Computer sketch model

<u>Modeled</u> (see page 8)
* Use current MOBILE model to generate emission factors.
* Choose appropriate CO dispersion model - CALINE, CAL3QHC, or other approved model.
* Background levels from DEQ *(contact UDOT Air Quality Coordinator to get background levels from DAQ)*
* Include all sensitive receptors
* Include mitigation measures if violations are predicted
* Include evidence of coordination with EPA and UTAH DEQ/DAQ
* Perform for all non-exempt projects located in CO non-attainment or maintenance areas

<-------------> ***Normal Range***
<:::::::::::::::> ***Possible Range***

C. Modeling Considerations

On major projects in all areas, CO hot spot analysis should be done on the top three worst congested project mainline locations and at intersections with LOS D, E, or F. Because EPA has not released quantitative PM-10 hot spot procedures, a qualitative PM-10 hot spot analysis is required for capacity projects in PM-10 non-attainment or maintenance areas. See appendix E for discussion of PM10 and CO qualitative analysis guidance.

Receptors. A receptor location is the point at which concentrations are estimated. The general rule is to locate or analyze receptors at a reasonable sample of sites where the general public is likely to have access and the maximum total project concentrations are likely to occur. A rule of thumb is to model any locations within 250 feet of the right-of-way which meet the following criteria. The general criteria can be restated as having three main parts: (1) places of expected one-hour and eight-hour maximum concentrations, (2) places where the general public has access over the time periods specified by the NAAQS, and (3) reasonableness. Receptors should not be located within 3 meters of the traveled roadway because vehicle turbulence does not allow current models to make valid concentrations estimates. If there is a structure within the 3 meter zone, then the EPA Regional Office should be contacted for a determination of proper receptor siting. Examples of reasonable receptor sites include, but are not limited to: residences, hospitals, rest homes, schools, playgrounds, and building entrances. When selecting receptor locations, particular attention should also be given to areas where pollution is likely to accumulate. For more detailed guidance reference the EPA publication "Guidelines for Air Quality Maintenance Planning and Analysis - Volume 9: Evaluating Indirect Sources," EPA-450/4-78-001.

Persistence Factor (PF). As discussed in the previous section, a persistence factor may be used to convert modeled one-hour CO concentration to an eight-hour concentration. The following details on the derivation and application of PF is extracted from EPA's "Guidelines for Modeling CO from Roadway Intersections," EPA-454/R-92-005.

Utilized since the mid-1970s, the concept of a PF represents a combination of the variability in both traffic and meteorological conditions, focusing on one-hour and eight-hour durations. Therefore, the ideal method for deriving a locally based PF is to use measured monitored CO concentration data.

A calculated PF is typically based on values obtained using the ratio of the eight-hour to the maximum one-hour measured CO concentration within the eight-hour period. This PF should be calculated for each of the ten highest non-overlapping eight-hour concentrations obtained from the latest three CO seasons of monitoring data and averaged. A CO season is generally defined as the period from October through April, but may vary in different areas of the country. If less than three CO seasons are not available, then the use of one or two seasons of data is acceptable.

However, if monitoring data are not available at all or there are less than three months of one CO season of data available, EPA recommends the use of a default factor of 0.7 to convert from a peak one-hour concentration to a peak eight-hour concentration. The 0.7 factor is a reasonably conservative PF based on studies of monitoring data throughout many regions of the country. If a PF other than 0.7 is obtained through the use of monitored data in a local area, it should be used instead of the default factor.

Background Concentration. Contact UDOT's Air Quality Coordinator, who will coordinate with DEQ for background concentration data. The one-hour CO concentration includes both the background and project-related CO concentration levels. Appropriate background concentrations can be estimated by looking at monitored values from previous analyses, taking monitoring data from State and local air quality agency monitors, or modeling efforts. However, monitoring data should be used with caution, since most existing CO monitors are purposely located where violations occur or are expected, and thus do not provide realistic background levels. Project monitoring, for either background or current project levels, should only be performed when other data are not available and the effort is warranted by expected controversy or air quality impacts. Consultation with State air quality agencies to assist in determining appropriate background levels may be beneficial. Except in areas with unusual meteorological conditions, typical background CO concentrations are 1.0 ppm for rural areas, or between 2.0 and 3.0 ppm for urban locations.

IV. Summary

Environmental documents must address air quality from two perspectives; Transportation Conformity (Including "Hot-Spot" requirements) and NEPA Air Quality Assessment. The level of work needed to adequately fulfill both the CAA and NEPA requirements is dependent on several factors: (1) the various NAAQS designations of the project area, (2) the type of project(s) under consideration, (3) the type of environmental documentation being prepared (CE, EA, or EIS), (4) the existence of any overriding State laws, policies, or procedures, (5) location specific features, such as weather conditions and topography, and (6) the level of anticipated controversy associated with the project. ***(See appendix C. II. For Criteria for Projects requiring Microscale Air Quality analysis.)***

Appendix A
Specific Citing from 40 CFR Part 93
Transportation Conformity "Hot-Spot" Requirements

' **93.116 Criteria and procedures**: Localized CO and PM 10 violations (hot spots).
(a) This paragraph applies at all times. The FHWA/FTA project must not cause or contribute to any new localized CO or PM10 violations or increase the frequency or severity of any existing CO or PM10 violations in CO and PM10 non-attainment and maintenance areas. This criterion is satisfied if it is demonstrated that no new local violations will be created and the severity or number of existing violations will not be increased as a result of the project. The demonstration must be performed according to the consultation requirements of ' 93.105(c)(1)(i) and the methodology requirements of ' 93.123.
(b) This paragraph applies for CO non-attainment areas as described in ' 93.109(d)(1). Each FHWA/FTA project must eliminate or reduce the severity and number of localized CO violations in the area substantially affected by the project (in CO non-attainment areas). This criterion is satisfied with respect to existing localized CO violations if it is demonstrated that existing localized CO violations will be eliminated or reduced in severity and number as a result of the project. The demonstration must be performed according to the consultation requirements of ' 93.105(c)(1)(i) and the methodology requirements of ' 93.123.
' 93.123 Procedures for determining localized CO and PM 10 concentrations (hot-spot analysis).
(a) CO hot-spot analysis. (1) The demonstrations required by ' 93.116 (Localized CO and PM10 violations) must be based on quantitative analysis using the applicable air quality models, data bases, and other requirements specified in 40 CFR part 51, Appendix W (Guideline on Air Quality Models). These procedures shall be used in the following cases, unless different procedures developed through the interagency consultation process required in ' 93.105 and approved by the EPA Regional Administrator are used: (i) For projects in or affecting locations, areas, or categories of sites which are identified in the applicable implementation plan as sites of violation or possible violation; (ii) For projects affecting intersections that are at Level-of-Service D, E, or F, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes related to the project; (iii) For any project affecting one or more of the top three intersections in the non-attainment or maintenance area with highest traffic volumes, as identified in the applicable implementation plan; and (iv) For any project affecting one or more of the top three intersections in the non-attainment or maintenance area with the worst level of service, as identified in the applicable implementation plan. (2) In cases other than those

described in paragraph (a)(1) of this section, the demonstrations required by ' 93.116 may be based on either: (i) Quantitative methods that represent reasonable and common professional practice; or (ii) A qualitative consideration of local factors, if this can provide a clear demonstration that the requirements of ' 93.116 are met.

(b) PM10 hot-spot analysis. (1) The hot-spot demonstration required by ' 93.116 must be based on quantitative analysis methods for the following types of projects: (i) Projects which are located at sites at which violations have been verified by monitoring; (ii) Projects which are located at sites which have vehicle and roadway emission and dispersion characteristics that are essentially identical to those of sites with verified violations (including sites near one at which a violation has been monitored); and (iii) New or expanded bus and rail terminals and transfer points which increase the number of diesel vehicles congregating at a single location. (2) Where quantitative analysis methods are not required, the demonstration required by ' 93.116 may be based on a qualitative consideration of local factors. (3) The identification of the sites described in paragraph (b)(1)(i) and (ii) of this section, and other cases where quantitative methods are appropriate, shall be determined through the interagency consultation process required in ' 93.105. DOT may choose to make a categorical conformity determination on bus and rail terminals or transfer points based on appropriate modeling of various terminal sizes, configurations, and activity levels. (4) The requirements for quantitative analysis contained in this paragraph (b) will not take effect until EPA releases modeling guidance on this subject and announces in the Federal Register that these requirements are in effect.

(c) General requirements. (1) Estimated pollutant concentrations must be based on the total emissions burden which may result from the implementation of the project, summed together with future background concentrations. The total concentration must be estimated and analyzed at appropriate receptor locations in the area substantially affected by the project. (2) Hot-spot analyses must include the entire project, and may be performed only after the major design features which will significantly impact concentrations have been identified. The future background concentration should be estimated by multiplying current background by the ratio of future to current traffic and the ratio of future to current emission factors. (3) Hot-spot analysis assumptions must be consistent with those in the regional emissions analysis for those inputs which are required for both analyses. (4) PM10 or CO mitigation or control measures shall be assumed in the hot-spot analysis only where there are written commitments from the project sponsor and/or operator to implement such measures, as required by ' 93.125(a). (5) CO and PM10 hot-spot analyses are not required to consider construction-related activities which cause temporary increases in emissions. Each site which is affected by construction-related activities shall be considered separately, using established Guideline methods. Temporary increases are defined as those which occur only during the construction phase and last five years or less at any individual site.

Appendix B
FHWA Technical Advisory 6640.8A
Guidance for Preparing and Processing Environmental and Section 4(f) Documents

(The full TA can be downloaded from FHWA web site: htpp:www.fhwa.dot.gov/legsregs/directives/techadvs/t664008a.htm)

See V. G. # 8. Air Quality Impacts ((a) Mesoscale {ozone areas} and (b) Microscale {CO areas} Scale Analysis)

Appendix C

I. Project-Level Conformity Determination Documentation

The first discussion needs to center on the areas current designation under the NAAQS. This should be accompanied by dates of designation/redesignation for the NAAQS and, where appropriate, the most current mobile source emission budgets with date of publication in the Federal Register. Providing a copy of the actual Federal Register notice would be most beneficial, but is not necessary.

Example:

Fakeville County was designated non-attainment for the ozone NAAQS on (month/day/year). Upon submission of the attainment demonstration and maintenance plan the area was redesignated to attainment on (month/day/year). The area is currently in the (number) year of its maintenance period. The current mobile source emission budgets were effective on (month/day/year) and are found in the (month/day/year) Federal register.

The discussion of conformity needs to identify that the project comes from the currently conforming plan and TIP. Dates need to be identified for when the conformity determination was made for both documents. This also should include which plan and TIP the project comes from. Providing a copy of the conformity determination would be most beneficial but is not necessary.

Example:

Project Fake comes from the currently conforming Fakeville 2025 Transportation Plan and 2000-2005 Fakeville TIP found to jointly conform via the federal conformity determination on (month/day/year).

II. Criteria for Determining Which Projects Require An Air Quality Analysis.

This section lists the specific criteria (and assumptions used to determine the criteria) in determining the need for conducting an air quality analysis. This is condensed from the document "Guideline for Modeling Carbon Monoxide From Roadway Intersections". EPA-454/R-92-005", refer to the EPA document for full guidance. This can be obtained from the EPA website: http://www.epa.gov/scram001.

Criteria for Projects Needing a Microscale Air Quality Analysis.

Carbon monoxide (CO) impacts are local; high concentrations are generally limited to within a relatively short distance of heavily traveled roadways. Consequently, it is appropriate to predict concentrations of CO on a localized or *microscale* basis. Depending on the nature of the proposed project, microscale air quality analysis may be required for both the mainline and intersections. The need for an analysis should be evaluated on any of the roadways in the project area or any other roadway affected by the project.

The determination for a required microscale analysis is based on the consideration of various criteria. The outcome of the consideration of the criteria will establish the need for a microscale air quality analysis. The criteria are described below in steps 1 - 8.

1. Evaluation Overview

Project/Intersection Description - in this evaluation a good project or intersection related narrative, including diagrams is to be provided. In the preparation of an air quality impact assessment for a new roadway project or evaluating existing intersections, a qualitative and quantitative description of the traffic and physical characteristics is needed.

2. Level of Service (LOS) Screening

LOS measures the operating conditions in the intersection and how these conditions affect traffic flow and delay (See the Highway Capacity Manual for full synopsis of LOS). Intersections that are LOS A, B, or C probably do not require further analysis, i.e., the delay and congestion would not likely cause or contribute to a potential CO exceedance of the NAAQS. Those intersections at LOS D, E, or F or those that have changed to LOS D, E, or F because of increased volumes of traffic or construction related to a new project in the vicinity should be considered for modeling.

On the mainline, the worst three congested locations should be analyzed.

3. Air Quality Objectives

This step is to determine the air quality objectives or goals of an analysis of air quality impact due to an intersection. The objectives will dictate the level of analysis, the resources, and the amount of effort required. If a project review is involved, the specific objective may be to assess the worst case potential for exceeding either the 1-hour or 8-hour Carbon monoxide (CO) NAAQS.

Under the transportation conformity regulation, if the project is in a CO non-attainment or maintenance area, the project cannot cause or contribute to any new localized CO violations or increase the frequency or severity of any existing CO violations.

This criterion applies at all times, and is satisfied if it is demonstrated that no new local violations will be created and the severity and number of existing violations will not be increased as a result of the project.

4. Assembly of All Data

Assembly of All Data necessary to formulate inputs to the modeling procedure. Some items that should be included in the data base are as follows:

- A scaled map of the intersection and nearby approaches/departures.
- Traffic engineering characteristics of each approach/departure to be analyzed, i.e., number of lanes, road width, turning channels, type of intersection control, and signal timing.
- Through, turning, and total traffic volumes and speeds for each road for the average peak hour traffic.
- Link coordinates and specification of the coordinate origin.
- Receptor coordinates.
- Background and local CO air quality measurements (see item 8. Below).
- Meteorological data, if area wide modeling using RAM or UAM will be performed.
- miscellaneous demographic data, such as urban/rural characterization and diurnal roadway traffic patterns.

5. Ranking and Selecting Intersections (by Volume, and LOS)

The following steps should be used for ranking and selecting intersections and

roadway mainline for modeling, using the CAL3QHC model[1].

a. Rank up to the top 20 intersections by traffic volumes;
b. Calculate the LOS for up to the top 20 intersections based on traffic volumes;
c. Rank the intersections by LOS;
d. Model the top 3 intersections based on the worst LOS;

The LOS calculations will provide an overall rating for the intersection in terms of a letter classification from A (the least delay and best operating) to F (the most delay and worst congestion and operation).

- Intersections that are calculated with a current or future LOS of A, B, or C need not be considered further because they do not have sufficient traffic volumes and delay to require further review.
- Three most congested roadway mainline locations and/or locations near sensitive receivers such as schools and hospitals.
- For those intersections with a LOS D, E, or F additional analysis is required to determine if these congested intersections should be reviewed further for air quality impacts.

e. Model the top 3 intersections based on the highest traffic volumes. Similarly, the three highest traffic ranked intersections should be modeled using the CAL3QHC model.

[1]The line source dispersion model, CAL3QHC is the current EPA regulatory screening model for line source CO dispersion modeling. The model applies the Gaussian dispersion theory and uses input meteorological conditions to compute pollutant (such as CO) concentrations from vehicles on the roadway. This model can be downloaded from the EPA's Bulletin Board @ http:/www.epa.gov.scram.

It is assumed that if the modeled intersections do not show an exceedance of the NAAQS, none of the subsequent ranked intersections will. This assumption is based on the assumption that these selected modeled intersections will have the highest CO impacts and that intersections with less traffic volumes and congestion will have lower ambient air impacts.
Thus, if no exceedances of the CO NAAQS occur for the attainment year when the results of the intersection modeling (from Step 5 above) are added to the area wide background CO concentration at the intersection, then the CO attainment demonstration is complete.

6. Intersection Analysis

When an individual intersection or group of intersections is being considered, the guidance is divided into two main components:

A. Assembling all required data including roadway geometry and receptor locations.
D. Applying the CAL3QHC model to calculate 1-hour and 8-hour concentrations for comparison with the NAAQS.

In a typical evaluation, the individual intersection or group of three highest ranked intersections based on traffic and LOS would be molded to calculate 1-hour and 8-hour concentrations for comparison with the NAAQS. When all intersections of interest have been modeled, the analysis may stop. The next step is to mitigate the violating intersections through lane reconfiguration, signal timing, traffic diversion, exclusive vehicle allowance per lane, or other techniques and then to rerun the analysis for the adjusted scenarios.

7. Estimating 8-hour Concentrations from 1-hour Concentrations

The primary focus in this calculation is on the relationship between 1-hour and 8-hour traffic volumes and meteorological conditions. Because the ratio of the 8-hour to 1-hour concentration estimate (***persistence factor***) represents a combination of the variability in both traffic and meteorological conditions, the ratio of measured monitored concentrations should be used to determine the persistence factor, since monitoring data include the effects of variability in both traffic and meteorological conditions.

The preferred method for the use of a persistence factor to estimate 8-hour concentrations from predicted maximum 1-hour CO concentrations, is to use monitoring data. The persistence factor (PF)

should be base on values obtained using the ratio of the 8-hour to the maximum 1-hour measured CO concentration within the 8-hour period. (See #1 page 10 & page 12 for more PF information)

This persistence factor should be calculated for each of the 10 highest non-overlapping 8-hour concentrations obtained from the latest three CO seasons of monitoring data and averaged. If less than three CO seasons are not available then the use of one or two seasons of data would be allowed.

If monitoring data are not available at all or there are less than 3 months of one CO season of data available, then use a 0.7 factor to convert from a peak 1-hour concentration to a peak 8-hour concentration. The 0.7 factor is a reasonably conservative persistence factor based on studies of monitoring data throughout many regions of the country. ***The EPA recommends the use of a 0.7 persistence factor in a local area where monitoring data are not available.***

Contact the UDOT Air Quality Programs Coordinator, Program Development Division, Urban Planning Group at 965-3809 for help in determining the persistence factor for a given area.

Appendix D

Documentation of Hot-Spot and NEPA Analysis

Again, the hot-spot analysis is used interchangeably to satisfy the NEPA and transportation conformity (for CO and PM10 non-attainment and maintenance areas) Hot-Spot requirements.

In addition to the previous discussion, it is recommended that analysis documentation should contain the following information, however, these are not all encompassing and would vary from project to project. Further specifications can be sought through State DOT and FHWA Division office representatives.

The analysis should document receptor locations with the highest 1 hour and 8 hour values taken into account the criteria outlined in III.C. page 10.

The reported values should include the wind angle at which the highest values occurred. A map showing the project and receptor location should be included.

All pertinent assumptions and data should be documented which led to the reported receptor values.

Finally, a statement that violations occurred or not should be reported.

Note: ***Question and Answer on Hot Spot Analysis*** , EPA Memorandum dated February 15,1994, Office of Air and Radiation "Memorandum on Transportation Conformity".

Q: Can a project be considered to satisfy the hot-spot criteria if the hot-spot analysis predicts a future violation with and without the project, but predicts that if the project is built, it will reduce the frequency and severity of the predicted future violations which would occur without the project.

A: **YES**, Such a project satisfies the hot-spot criteria. Such a project would not be considered to be contributing to a new violation. *Since the project is helpful, it would not promote clean air by preventing it from being under taken.* In a non-attainment area with an approve SIP, the SIP should already address the future hot spot. If not, the appropriate action is for the State to volunteer or for EPA to call for a SIP revision.

APPENDIX E
Qualitative Analysis for CO and PM10, and Exempt Projects

A. Qualitative Analysis for CO and PM10

1. CO Hot Spot

TEXT TO BE ADDED SOON

2. PM10

For Qualitative PM10 guidance See "Guidance for Qualitative Project Level "Hot Spot" Analysis in PM10 Nonattainment and Maintenance Areas." FHWA, dated September 2001.

The referenced document provides guidance and suggested approaches for performing a qualitative analysis of highway and transit projects in areas that are designated nonattainment or maintenance for particulate matter less than or equal to 10 microns in diameter. This project-level analysis, also referred to as a "hot spot" analysis is required by the Transportation Conformity Rule (40 CFR Parts 51 and 93).

B. 1. Sec. 93.126 Exempt projects. (40 CFR Part 93, Transportation Conformity Regs)

Notwithstanding the other requirements of this subpart, highway and transit projects of the types listed in ***Table 2 of this section are exempt from the requirement to determine conformity.*** Such projects may proceed toward implementation even in the absence of a conforming transportation plan and TIP. A particular action of the type listed in Table 2 of this section is not exempt if the MPO in consultation with other agencies (see Sec. 93.105(c)(1)(iii)), the EPA, and the FHWA (in the case of a highway project) or the FTA (in the case of a transit project) concur that it has potentially adverse emissions impacts for any reason. States and MPOs must ensure that exempt projects do not interfere with TCM implementation. Table 2 follows:

Table 2.--Exempt Projects

Safety

Railroad/highway crossing.
Hazard elimination program.
Safer non-Federal-aid system roads.
Shoulder improvements.
Increasing sight distance.
Safety improvement program.
Traffic control devices and operating assistance other than

signalization projects.
Railroad/highway crossing warning devices.
Guardrails, median barriers, crash cushions.
Pavement resurfacing and/or rehabilitation.
Pavement marking demonstration.
Emergency relief (23 U.S.C. 125).
Fencing.
Skid treatments.
Safety roadside rest areas.
Adding medians.
Truck climbing lanes outside the urbanized area.
Lighting improvements.
Widening narrow pavements or reconstructing bridges (no additional travel lanes).
Emergency truck pullovers.

Mass Transit

Operating assistance to transit agencies.
Purchase of support vehicles.
Rehabilitation of transit vehicles \1\.
Purchase of office, shop, and operating equipment for existing facilities.
Purchase of operating equipment for vehicles (e.g., radios, fareboxes, lifts, etc.).
Construction or renovation of power, signal, and communications systems.
Construction of small passenger shelters and information kiosks.
Reconstruction or renovation of transit buildings and structures (e.g., rail or bus buildings, storage and maintenance facilities, stations, terminals, and ancillary structures).
Rehabilitation or reconstruction of track structures, track, and trackbed in existing rights-of-way.
Purchase of new buses and rail cars to replace existing vehicles or for minor expansions of the fleet \1\.
Construction of new bus or rail storage/maintenance facilities categorically excluded in 23 CFR part 771.

Air Quality

Continuation of ride-sharing and van-pooling promotion activities at current levels.
Bicycle and pedestrian facilities.

Other

Specific activities which do not involve or lead directly to construction, such as:
- Planning and technical studies.
- Grants for training and research programs.
- Planning activities conducted pursuant to titles 23 and 49 U.S.C.
- Federal-aid systems revisions.

Engineering to assess social, economic, and environmental effects of the proposed action or alternatives to that action.
Noise attenuation.
Emergency or hardship advance land acquisitions (23 CFR 712.204(d)).
Acquisition of scenic easements.
Plantings, landscaping, etc.
Sign removal.
Directional and informational signs.
Transportation enhancement activities (except rehabilitation and operation of historic transportation buildings, structures, or facilities).
Repair of damage caused by natural disasters, civil unrest, or terrorist acts, except projects involving substantial functional, locational or capacity changes.

Note: \1\In PM10 nonattainment or maintenance areas, such projects are exempt only if they are in compliance with control measures in the applicable implementation plan

2. Sec. 93.127 Projects exempt from regional emissions analyses.

Notwithstanding the other requirements of this subpart, highway and transit projects of the types listed in Table 3 of this section are exempt from regional emissions analysis requirements. **The local effects of these projects with respect to CO or PM10 concentrations must be considered to determine if a hot-spot analysis is required prior to making a project-level conformity determination.** These projects may then proceed to the project development process even in the absence of a conforming transportation plan and TIP. A particular action of the type listed in Table 3 of this section is not exempt from regional emissions analysis if the MPO in consultation with other agencies (see Sec. 93.105(c)(1)(iii)), the EPA, and the FHWA (in the case of a highway project) or the FTA (in the case of a transit project) concur that it has potential regional impacts for any reason.

Table 3 follows:

Table 3.--Projects Exempt From Regional Emissions Analyses

Intersection channelization projects.
Intersection signalization projects at individual intersections.
Interchange reconfiguration projects.
Changes in vertical and horizontal alignment.
Truck size and weight inspection stations.
Bus terminals and transfer points.
